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UTILITY
PATENT APPLICATION
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Attorney Docket No. 32857
First Inventor or Application Identifier Masaki Seike
Title MOBILE COMMUNICATION TERMINAL
Express Mail Label No. EL633643786US

J09/03/00 U.S. PTO

08/03/00

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
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1. ☒ * Fee Transmittal Form (e.g., PTO/SB/17)
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2. ☒ Specification [Total Pages 17]
(preferred arrangement set forth below)
- Descriptive title of the invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to Microfiche Appendix
 - Background of the invention
 - Brief Summary of the invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 6]
4. Oath or Declaration [Total Pages 3]
- a. ☒ Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 16 completed)
- i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting
inventor(s) named in the prior application,
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

5. ☐ Microfiche Computer Program (Appendix)
6. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
- a. ☐ Computer Readable Copy
- b. ☐ Paper Copy (identical to computer copy)
- c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. ☒ Assignment Papers (cover sheet & document(s))
8. ☐ 37 C.F.R. § 3.73(b) Statement (when there is an assignee) ☒ Power of Attorney
9. ☐ English Translation Document (if applicable)
10. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS Citations
11. ☐ Preliminary Amendment
12. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
13. ☐ * Small Entity Statement(s) ☐ Statement filed in prior application, Status still proper and desired (PTO/SB/09-12)
14. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
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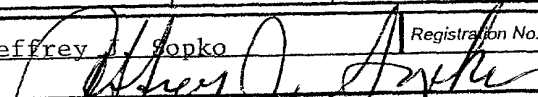
16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:
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- Prior application information: Examiner _____ Group / Art Unit: _____

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

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| Name (Print/Type) | Jeffrey J. Sopko | Registration No. (Attorney/Agent) | 27676 |
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PATENT

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Attorney Docket No. 32857



Assistant Commissioner for Patents
Box PATENT APPLICATION
Washington, D.C. 20231

Sir:

Transmitted herewith for filing by other than a small entity is the patent application of:

Inventor: Masaki Seike and Tetsuya Yamaguchi

For: MOBILE COMMUNICATION TERMINAL

6 sheets of formal drawings are included.

An assignment of the invention to Matsushita Electric Industrial Co., Ltd. is included along with a Recordation Form Cover Sheet. Please record and return the assignment to the undersigned.

Priority is claimed under 35 U.S.C. §119 on the basis of the following foreign applications:

Japanese Patent Application No. Hei. 11-222593 Filed August 5, 1999

A certified copy of this application will be forwarded.

An Information Disclosure Statement is enclosed.

"Express Mail" mailing label number EL633643786US

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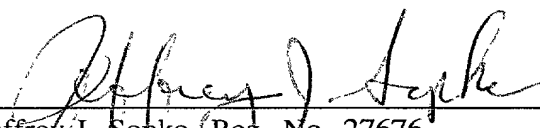
| For | Number | Rate | Fees | |
|--|--------|------|------------------|----------|
| Total claims in excess of 20: | 0 | × | \$18.00 | \$0.00 |
| Independent claims in excess of 3: | 0 | × | \$78.00 | \$0.00 |
| Multiple dependent claims, if any, add surcharge of \$260.00: | | | | \$0.00 |
| Non English Specification, add surcharge of \$130.00: | | | | \$0.00 |
| | | | Basic Fee | \$690.00 |
| | | | TOTAL FILING FEE | \$690.00 |
| Assignment Recordal Fee of \$40.00 | | | | \$40.00 |
| | | | TOTAL FEE | \$730.00 |

A check in the amount of the Total Fee calculated above is enclosed.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§1.16 and 1.17 which may be required during the entire pendency of this application, or to credit any overpayment, to Deposit Account No. 16-0820, Order No. 32857.

Respectfully,

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Jeffrey J. Sopko, Reg. No. 27676

Date: 8/3/00

MOBILE COMMUNICATION TERMINAL

BACKGROUND OF THE INVENTION

The present invention relates to a mobile communication
5 terminal such as a mobile telephone, pager, PHS, etc. that can
prevent loss of information by storing necessary information when
a low voltage operation occurs.

In the conventional mobile communication terminal,
personal information such as a telephone directory and saved
10 messages which are seldom updated and frequency information,
address information, etc. which are updated many times but loss
of which is not permitted are recorded in a nonvolatile storing
medium such as a flash ROM, EEPROM, etc. whereas information
(information items) such as time information, etc. which are
15 updated many times are recorded in a volatile storing medium such
as RAM, etc.

Also, as for the information stored in the volatile
storing medium, loss of the information stored in the volatile
storing medium such as RAM, etc. due to a low voltage operation
20 is prevented by using a secondary battery, etc.

However, upon managing back-up information in the
conventional mobile communication terminal, if the information
items, e.g., time information, etc. which are updated many times
are recorded in the nonvolatile storing medium such as EEPROM,
25 etc., such nonvolatile storing medium is degraded and in turn the

lifetime of the mobile communication terminal itself is affected,
and thus it is difficult to realize such management. Also, if
the update number of times is reduced, the time information, etc.
which need a real-time property lose their value. Hence, there
5 is no means except that such information are stored in the volatile
storing medium such as RAM, etc.

Also, in order not to lose the information stored in the
volatile storing medium such as RAM, etc., the secondary battery
is needed. This results in the increase of cost of the mobile
10 communication terminal.

SUMMARY OF THE INVENTION

Therefore, it is an object of the present invention to
provide a mobile communication terminal which can execute back-up
information management by storing information items, e.g., time
15 information, etc., which are updated many times, in sequence into
a plurality of memory areas of a nonvolatile storing medium so
as to prevent the degradation of the nonvolatile storing medium.

Also, it is another object of the present invention to
provide a mobile communication terminal that can execute back-up
20 information management by storing necessary information so as to
prevent loss of the information when a low voltage operation is
caused.

In order to overcome the above problem, a mobile
communication terminal of the present invention comprises an
25 information managing portion, and a nonvolatile storing medium

attached to the information managing portion, wherein the nonvolatile storing medium has a plurality of memory areas for storing same information items.

According to this configuration, when storing of the
5 information items, e.g., the time information, etc., whose access frequency is high are updated by using the nonvolatile storing medium such as EEPROM, etc., the burden imposed on the nonvolatile storing medium can be reduced. Thus, the information items having a high updating frequency, e.g., the time information, etc. can
10 be stored in the nonvolatile storing medium whose lifetime is short and then employed.

Also, the mobile communication terminal of the present invention has a function for attaching numbers indicating updated sequences when the information are stored in the nonvolatile
15 storing medium.

According to this configuration, the information managing portion can decide the updated sequences of the same information items stored over a plurality of areas of the nonvolatile storing medium.

20 In addition, a mobile communication terminal of the present invention comprises an information managing portion, and a nonvolatile storing medium and a volatile storing medium attached to the information managing portion, and has functions of checking consistency between the nonvolatile storing medium
25 and the volatile storing medium in an initial state such as

turning-ON of a power supply, looking up the information stored in the nonvolatile storing medium if lack of the consistency of the information stored in the volatile storing medium is caused, and checking normality of the information stored in the volatile storing medium by comparing it with the information stored in the nonvolatile storing medium unless lack of the consistency of the information stored in the volatile storing medium is caused.

According to this configuration, it is possible to utilize effectively the information stored in the nonvolatile storing medium such as RAM, which has a high possibility to lack the consistency of the information but stores the latest information.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a view showing a management configuration of a mobile communication terminal for executing back-up information management according to a first embodiment of the present invention;

FIG.2 is a view showing a management configuration of a mobile communication terminal for executing back-up information management according to a second embodiment of the present invention;

FIG.3 is a flowchart having algorithm for deciding the latest information from a plurality of areas of a nonvolatile storing medium, in the mobile communication terminal according to the second embodiment of the present invention;

FIG.4 is a view showing a management configuration of a mobile communication terminal for executing back-up information management according to a third embodiment of the present invention;

5 FIG.5 is a flowchart having algorithm for checking consistency and normality of information stored in the nonvolatile storing medium and the volatile storing medium in the mobile communication terminal for executing back-up information management according to the third embodiment of the present
10 invention;

FIG.6 is a view showing a management configuration of a mobile communication terminal for executing back-up information management according to a fourth embodiment of the present invention; and

15 FIG.7 is a view showing a management configuration of a mobile communication terminal for executing back-up information management according to a fifth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 Embodiments of the present invention will be explained with reference to FIG.1 to FIG.7 hereinafter.

(First Embodiment)

FIG.1 shows a management configuration of a mobile communication terminal for executing back-up information
25 management according to a first embodiment of the present

invention.

In FIG.1, an information managing portion 1 instructs a nonvolatile storing medium 2 of an update or reference address, and then the nonvolatile storing medium 2 executes updating or
5 looking-up of the data in response to this. Here, in the mobile communication terminal for executing the back-up information management of the present invention, upon updating, the information managing portion 1 does not update a single information item in only a single memory area of the nonvolatile
10 storing medium 2 every time but updates information items in a plurality of memory areas sequentially.

For example, in the case that there exists the time information whose data is updated once in three minutes, the writing number of times in one memory area a day becomes 480 number
15 of times when the time information is stored in EEPROM (whose writing area is fixed to one area only) as one of the nonvolatile storing medium. Since it is said that normally the lifetime of EEPROM is one million number of times in writing, the lifetime is assumed as about 2000 days (about six years) based on this fact.

20 Then, if three writing areas are employed, the writing number of times in one memory area a day becomes 160 number of times. That is, the lifetime becomes about 6000 days (about eighteen years).

In the case that a product which has ten years as the term
25 of guarantee of the product is to be fabricated, the term of

guarantee of the product comes up to six years if the EEPROM is utilized by the former means whereas the term of guarantee of the product can be attained if the EEPROM is utilized by the latter means.

5 Therefore, information items, e.g., time information, etc. which are updated many times can be stored in the nonvolatile storing medium such as EEPROM, etc. by executing the back-up information management as shown in the first embodiment of the present invention. As a result, such information items can be
10 employed not to affect the lifetime of the mobile communication terminal itself, and also a cost of the mobile communication terminal can be reduced.

(Second Embodiment)

FIG.2 shows a management configuration of a mobile
15 communication terminal for executing back-up information management according to a second embodiment of the present invention.

In FIG.2, the management configuration of the mobile communication terminal for executing back-up information
20 management according to the second embodiment is almost similar to that of the mobile communication terminal for executing back-up information management according to the first embodiment. But there is such a difference that numbers (A to C) indicating loading sequences are stored in a plurality of memory areas (three memory
25 areas Data 1-1 to Data 1-3 herein) belonging to the nonvolatile

storing medium 2.

FIG.3 shows a flowchart having algorithm for deciding the latest information by using the numbers (A to C) stored in a plurality of memory areas based on the management configuration shown in FIG.2. In this case, the numbers (A to C) stored in FIG.2 are assigned in the ascending order in this example, and then such numbers are corrected to return to an initial value once again when such number reaches a certain value. However, if such numbers are assigned in the descending order, it is possible to render the mobile communication terminal to execute the similar operation.

In the flowchart in FIG.3, first of all, a head number (A is this example) in a plurality of memory areas is assumed as the latest one (process 22). Then, the number in the succeeding area is compared with the latest number (A herein) (process 24).

Then, if the number in the succeeding area is larger than the latest number, the number in the succeeding area is assumed as the latest one (process 25). After this process is applied to all objective areas (process 26), it is possible to say the data stored in the area, to which the number being assumed finally as the latest one among them is assigned, as the latest data.

According to this, it is feasible to search the latest information based on the same information stored in a plurality areas of the nonvolatile storing medium. Thus, even when the latest information such as time information, etc. are requested,

it is possible to respond such request.

(Third Embodiment)

FIG.4 shows a management configuration of a mobile communication terminal for executing back-up information management according to a third embodiment of the present invention.

In FIG.4, the information managing portion 1 has the nonvolatile storing medium 2 and the volatile storing medium 3 both being attached to the information managing portion 1.

FIG.5 shows a flowchart having algorithm for checking consistency (whether or not the wrong information is stored) and normality (whether or not this information may be employed as new data) of information stored in the volatile storing medium 3.

In process 30 and process 31 in FIG.5, the information managing portion 1 looks up the data stored in the volatile storing medium 3 and the nonvolatile storing medium 2. In this case, the process 31 must select the latest information when plural reference data are stored in the nonvolatile storing medium 2.

In the situation at this time (FIG.4), since the data is stored in a single area, there is no necessary to take account of this especially.

In turn, process 32 is carried out to check whether or not the data looked up by the volatile storing medium 3 is not the wrong data. For example, since February is present in the time information but 13-th month is not present, such 13-th month

is the wrong data. Also, it is checked in the process 32 whether or not the data looked up by the volatile storing medium 3 is the latest information.

If both conditions are satisfied (the looked-up data is not the wrong information and the information in the volatile storing medium 3 is the latest information), the information is compared with the latest information in the nonvolatile storing medium 2. Here, as the comparison with the nonvolatile storing medium 2, for example, in the case of the time information, process 33 is carried out to check whether or not there is not a considerable difference between the latest information in the nonvolatile storing medium 2 and the information in the volatile storing medium 3. (For example, if the information in the nonvolatile storing medium 2 is 10:20 but the information in the volatile storing medium 3 is 19:11, there is a remarkable difference between them. That is, there is high possibility that the information in the volatile storing medium 3 contains any error.

On the contrary, if the information in the volatile storing medium 3 is 10:21 in contrast to the information in the nonvolatile storing medium 2, such a possibility is very high that the information in the volatile storing medium 3 has been updated to 10:21.)

If the above conditions are satisfied, the information stored in the volatile storing medium 3 is set as the latest normal information (process 35). In contrast, unless the conditions are

satisfied in process 32 and process 33, the information stored in the nonvolatile storing medium 2 is set as the latest normal information (process 34).

5 This algorithm makes it possible to check whether or not the information stored in the volatile storing medium 3 coincides with the updated information precisely. Since the information stored in the volatile storing medium 3 is updated frequently rather than the nonvolatile storing medium 2, there is a high possibility that the latest information is stored in the volatile
10 storing medium 3.

It should be noted that terms of ROM and RAM in FIG.5 are used as the normal terms representing the nonvolatile storing medium and the volatile storing medium respectively.

(Fourth Embodiment)

15 FIG.6 shows a management configuration of a mobile communication terminal for executing back-up information management according to a fourth embodiment of the present invention. According to comparison of the configuration in FIG.6 with the configuration in FIG.4, they are different in that a
20 plurality of memory areas for storing the same information items belonging to the nonvolatile storing medium 2 are provided, but remaining portions are identical.

As can be seen from this configuration, FIG.6 shows the configuration obtained by combining the configurations in FIG.1
25 and FIG.4 together. The loading number of times into the same

area of the nonvolatile storing medium 2 can be reduced rather than the configuration in FIG.4. Thus, the lifetime of the nonvolatile storing medium 2 can be extended.

(Fifth Embodiment)

5 FIG.7 shows a management configuration of a mobile communication terminal for executing back-up information management according to a fifth embodiment of the present invention. According to comparison of the configuration in FIG.7 with the configuration in FIG.6, they are different in that numbers
10 are affixed to a plurality of memory areas for storing the same information items belonging to the nonvolatile storing medium 2 to indicate the updated sequences, but remaining portions are identical.

As can be seen from this configuration, FIG.7 shows the
15 configuration obtained by combining the configurations in FIG.2, FIG.3, and FIG.4 together. The information updated at the latest time can be decided by looking up the numbers affixed to a plurality of memory areas belonging to the nonvolatile storing medium 2.

As described above, according to the present invention,
20 the information items such as the time information, etc., which are employed in the mobile communication terminal such as the mobile telephone, PHS, the pager, or the like and whose updating frequency is high, can be loaded in sequence into a plurality of areas of the nonvolatile storing medium such as EEPROM, flash ROM,
25 etc. Therefore, the degradation of the nonvolatile storing

medium whose lifetime is short can be prevented, and accordingly the term of quality guarantee of the mobile communication terminal can be extended.

In addition, consistency between the nonvolatile storing medium and the volatile storing medium is checked in the initial state such as turning-ON of the power supply, etc., and then the information stored in the nonvolatile storing medium can be referred to if lack of the consistency of the information stored in the volatile storing medium is caused, otherwise the information stored in the volatile storing medium can be compared with the information stored in the nonvolatile storing medium unless lack of the consistency of the information stored in the volatile storing medium is caused. Therefore, the information stored in the volatile storing medium that has a high possibility to store the latest information can be utilized effectively.

WHAT IS CLAIMED IS:

1. A mobile communication terminal comprising:
an information managing portion; and
a nonvolatile storing medium managed by the information
5 managing portion, which has a plurality of memory areas for storing
same information items,

wherein said information managing portion stores
sequentially the same information items having a high updating
frequency in a plurality of memory areas respectively.

10

2. A mobile communication terminal as claimed in claim
1, wherein said information managing portion attaches management
numbers indicating updated sequences upon storing information
having a high updating frequency to the nonvolatile storing medium
15 at a time of updating the information, and then decides the updated
sequences of the information having the high updating frequency
based on the management numbers when the information managing
portion looks up the information in the nonvolatile storing
medium.

20

3. A mobile communication terminal comprising:
an information managing portion; and
a nonvolatile storing medium and a volatile storing
medium both managed by the information managing portion;
25 wherein said information managing portion stores same

information into the nonvolatile storing medium and the volatile storing medium, then checks consistency between the nonvolatile storing medium and the volatile storing medium in an initial state such as turning-ON of a power supply, and then looks up the
5 information stored in the nonvolatile storing medium as the information having normality if lack of the consistency of the information stored in the volatile storing medium is caused.

4. A mobile communication terminal as claimed in claim
10 3, wherein said information managing portion checks normality of the information by comparing with the information stored in the nonvolatile storing medium unless lack of the consistency of the information stored in the volatile storing medium is caused.

15 5. A mobile communication terminal as claimed in claim 4, wherein said information managing portion stores same information into the nonvolatile storing medium and the volatile storing medium at different timings.

20 6. A mobile communication terminal as claimed in claim 3, wherein said nonvolatile storing medium has a plurality of memory areas for storing same information items, and said information managing portion stores sequentially the same information items having a high updating frequency into a
25 plurality of memory areas of the nonvolatile storing medium.

7. A mobile communication terminal as claimed in claim
3, wherein said nonvolatile storing medium has a plurality of
memory areas for storing same information items, and said
information managing portion attaches management numbers
5 indicating updated sequences upon storing information having a
high updating frequency to the nonvolatile storing medium at a
time of updating the information, and then decides the updated
sequences of the information having the high updating frequency
based on the management numbers when the information managing
10 portion looks up the information in the nonvolatile storing
medium.

ABSTRACT OF DISCLOSURE

A mobile communication terminal comprises an information managing portion 1, and a nonvolatile storing medium 2 attached to the information managing portion 1, and the nonvolatile storing medium 2 has a plurality of memory areas for storing same information items in sequence. According to this configuration, when storing of the information items, e.g., the time information, etc., whose access frequency is high are updated by using the nonvolatile storing medium, the burden imposed on the nonvolatile storing medium can be reduced by using different areas. Thus, the information items having a high updating frequency, e.g., the time information, etc. can be stored in the nonvolatile storing medium whose lifetime is short and then employed.

FIG. 1

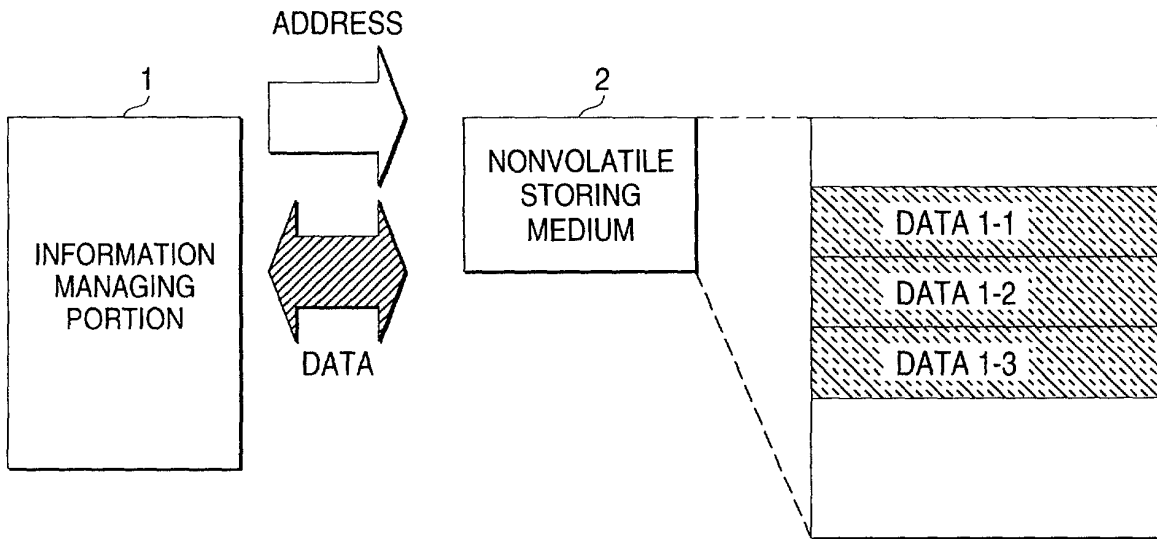


FIG. 2

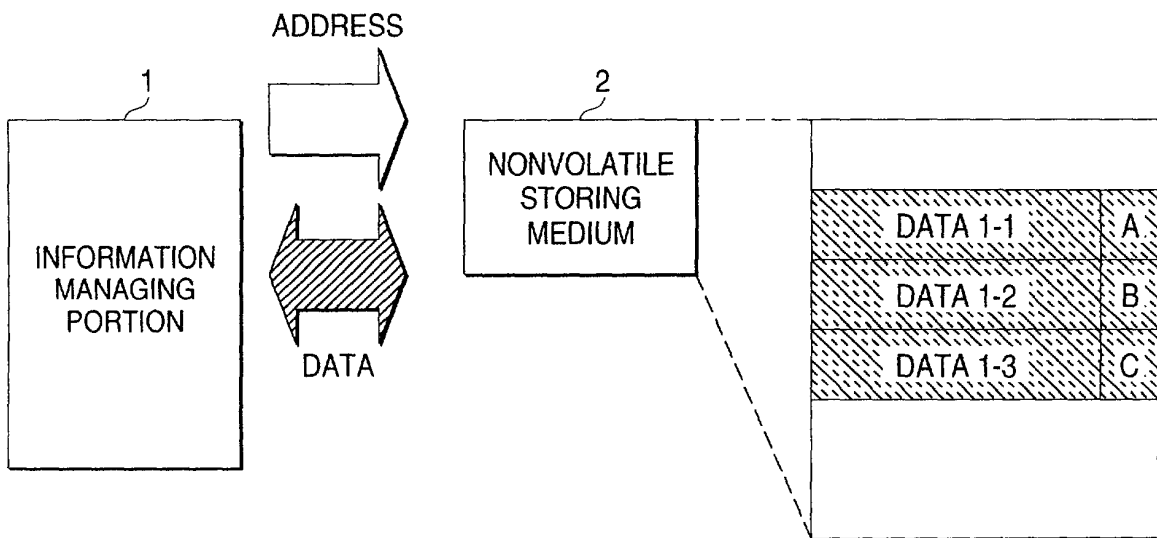


FIG. 3

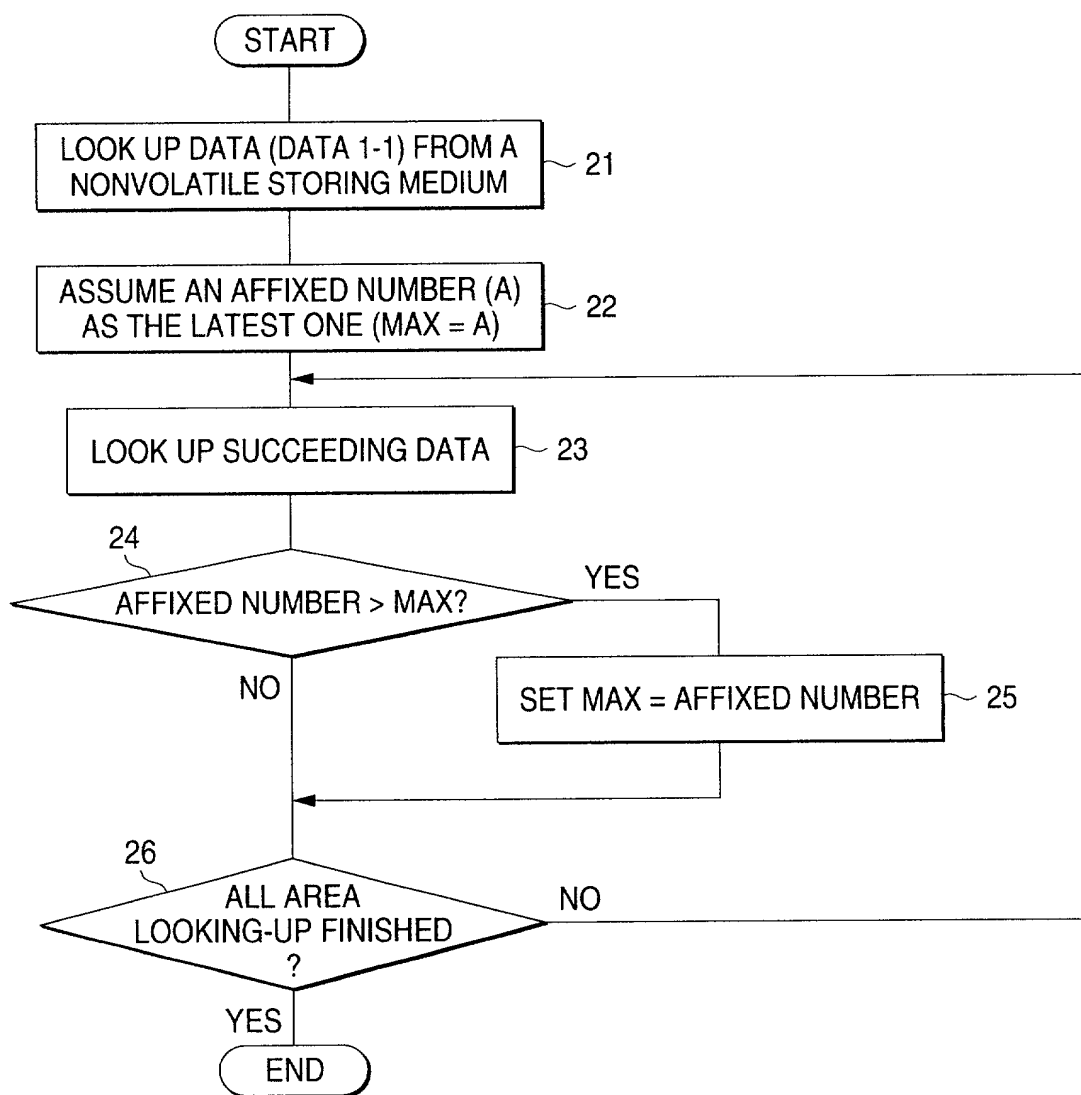


FIG. 4

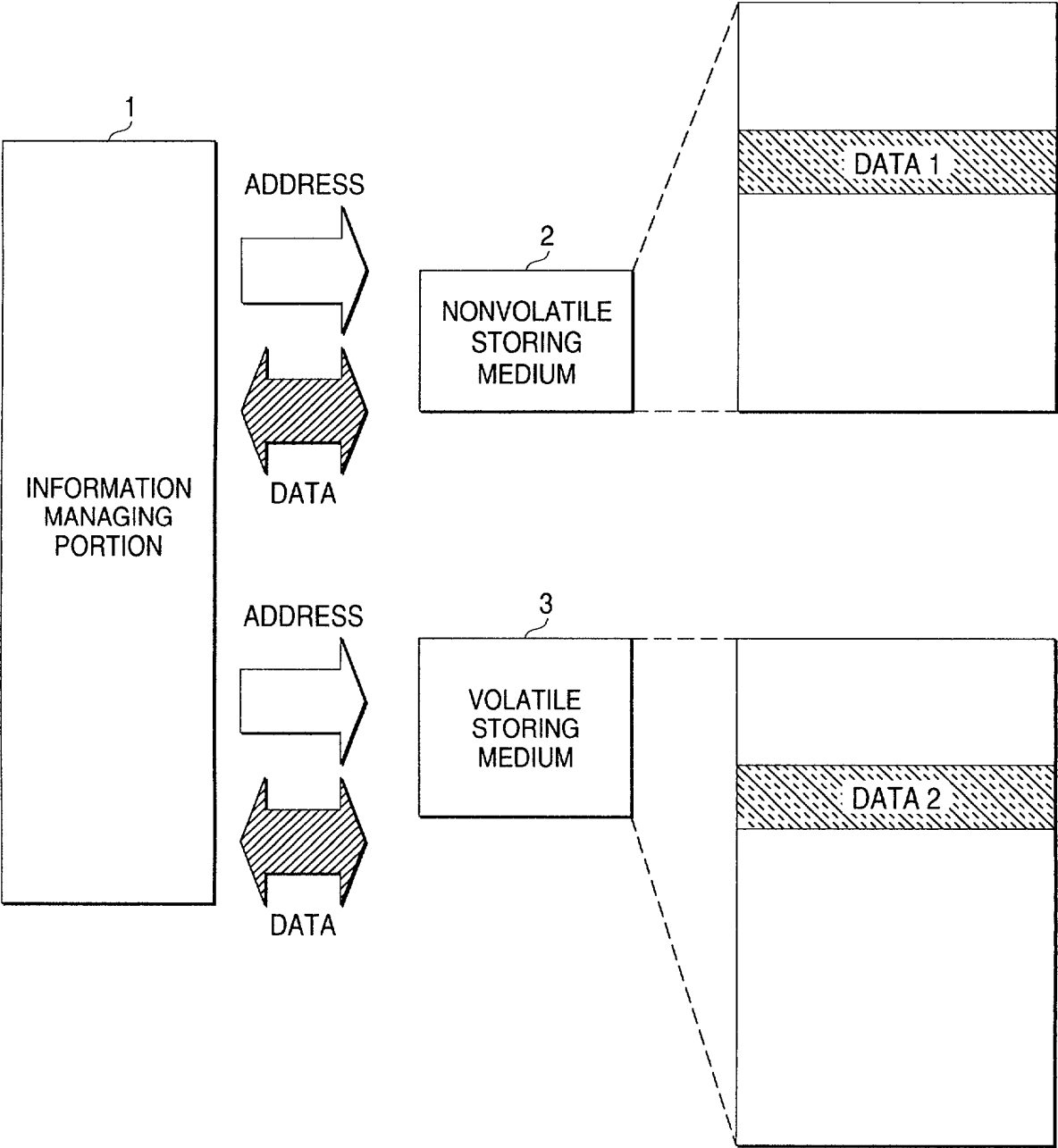


FIG. 5

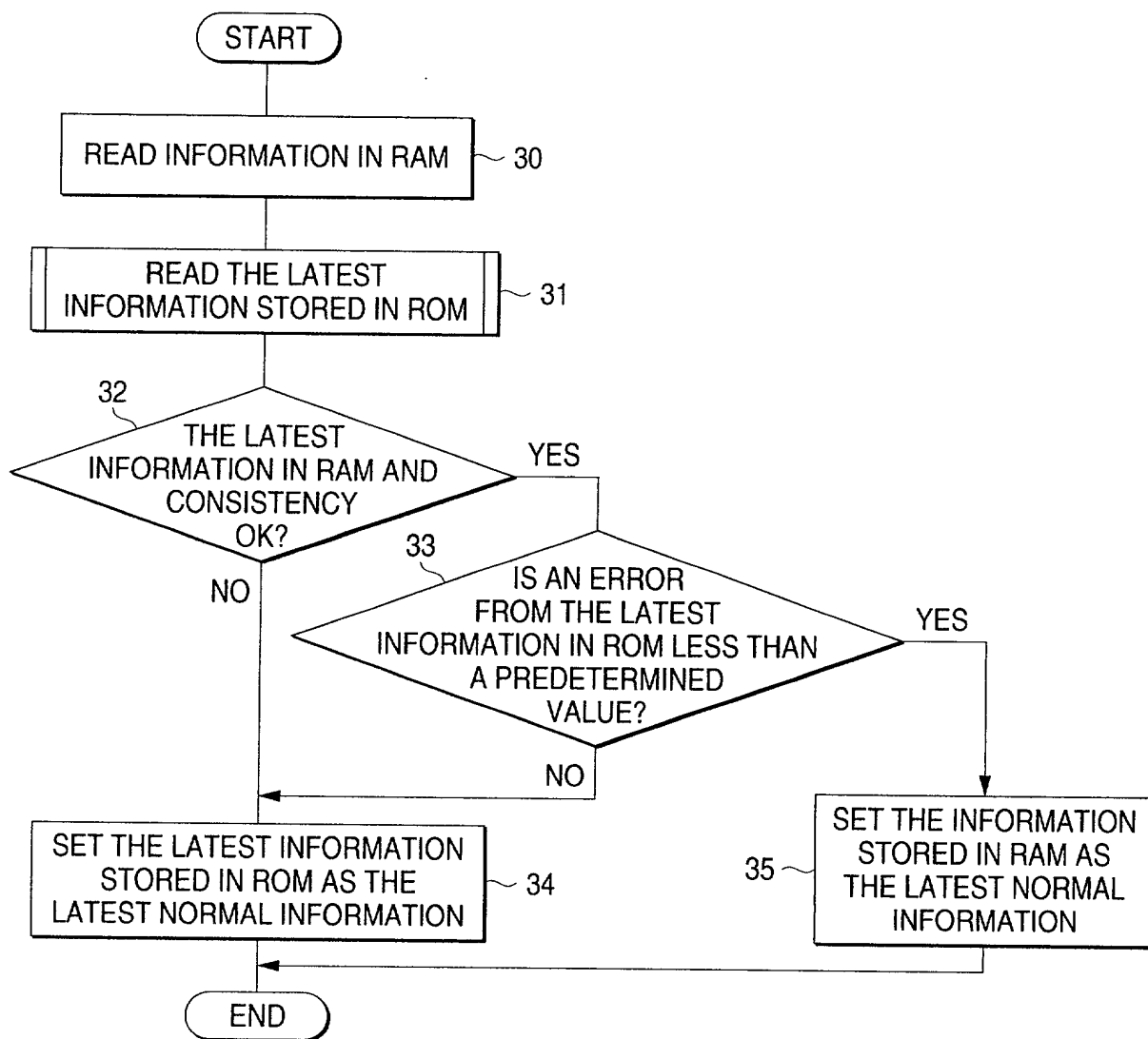


FIG. 6

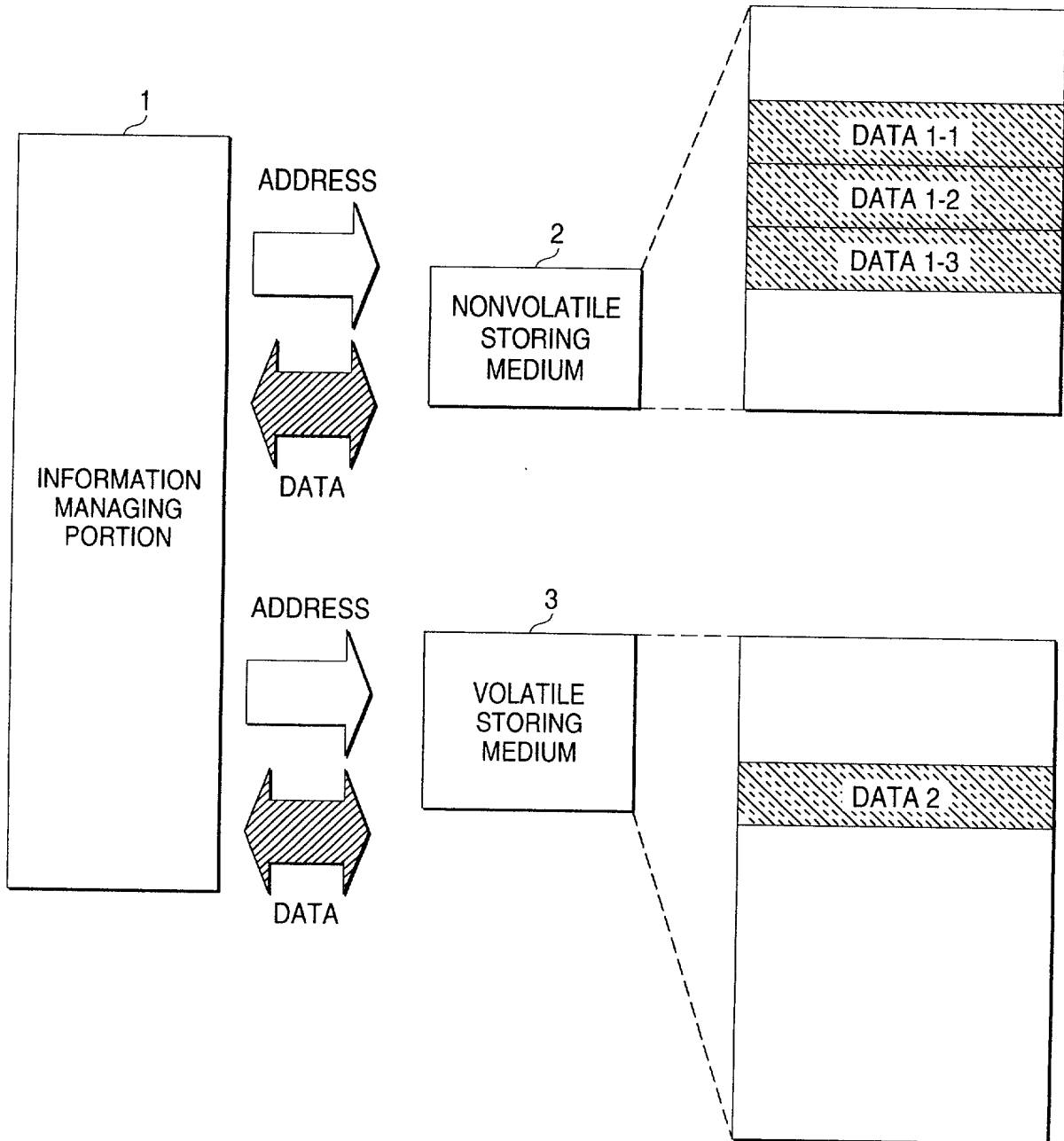
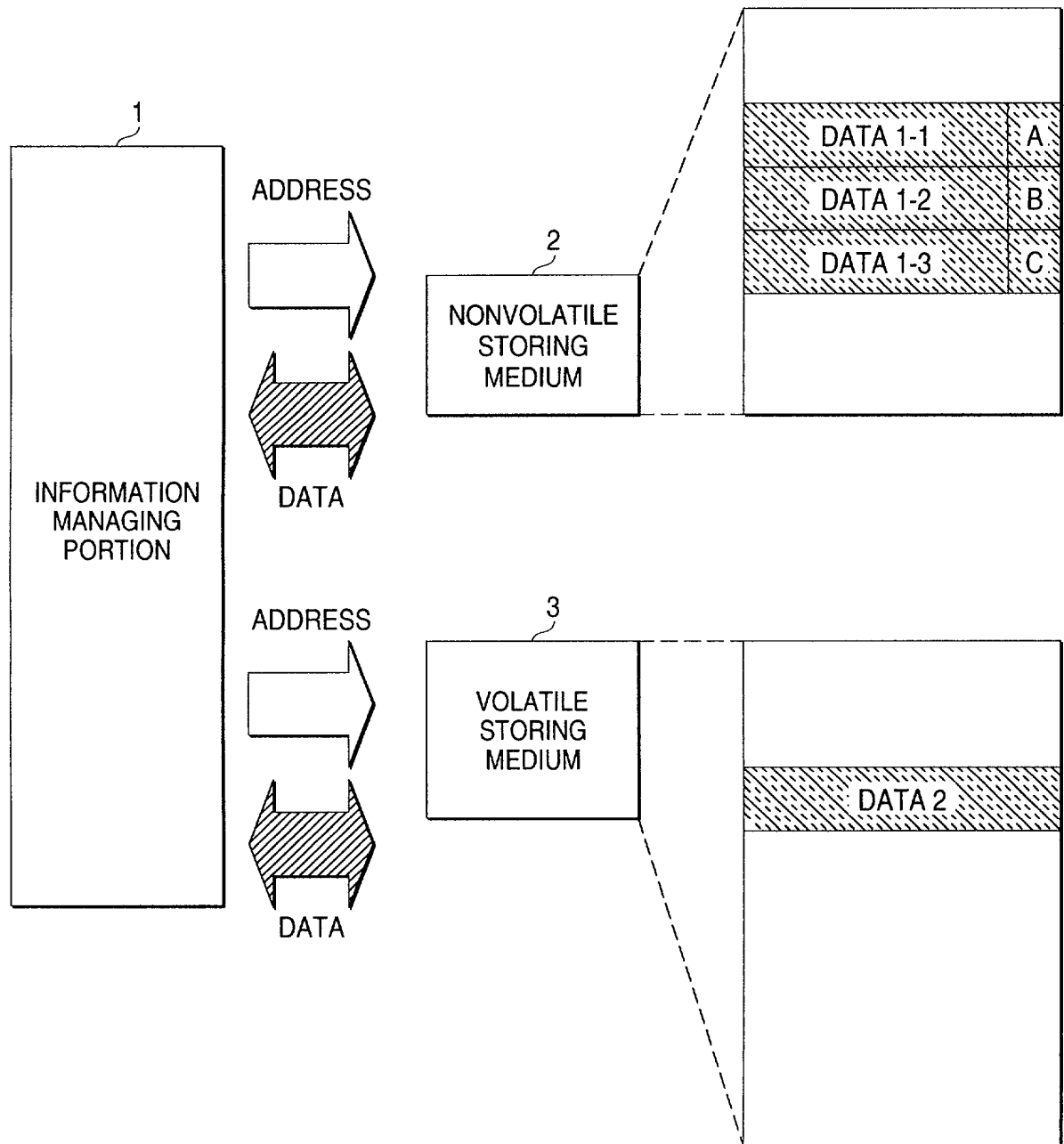


FIG. 7



**COMBINED DECLARATION AND POWER OF ATTORNEY
IN ORIGINAL APPLICATION**
(Sole or Joint - Foreign)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

MOBILE COMMUNICATION TERMINAL

the specification of which

X is attached hereto.

_____ was filed on _____ as application Serial No. _____ and was amended on _____.

I hereby state that I have reviewed and understand the content of the above-identified specification, including the claims (Pearne, Gordon, McCoy & Granger Docket No. 32857), as amended by any amendment referred to above. I acknowledge my duty to disclose information of which I am aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119, of any foreign application(s) for patent or inventor's certificate listed below, and have also identified below any foreign applications for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

| Country | Application Number | Filing Date (day/month/year) | Priority Claimed? | |
|---------|----------------------|------------------------------|-------------------|----|
| | | | Yes | No |
| Japan | P. Hei. 11-222593 | 5/August/1999 | XX | |

I hereby designate the following as my mailing address and telephone number:

Pearne, Gordon, McCoy & Granger
1200 Leader Building
Cleveland, Ohio 44114
(216) 579-1700

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

(1) Inventor (sole or joint): Masaki SEIKE

Citizenship: Japan

Signature Masaki Seike

Date July 12, 2000

Residence: Kanagawa, Japan

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